Spherical Modular Self-Powered Exergy Generator

Project Overview:
A **self-powered, spherical modular exergy generator** designed to harvest energy from multiple environmental sources and provide scalable, maintenance-minimized electricity. The system integrates solar, piezo/triboelectric, thermoelectric, and RF/EM energy capture, with mechanical storage (flywheel + clockwork), hybrid supercapacitor/solid-state battery storage, and AI-driven energy routing.

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1. Modular Architecture

- **Puzzle-Like Modules:** Each functional unit forms a segment of the geodesic sphere.
- **Modules Include:**
  - Solar PV segments
  - Piezo/triboelectric vibration modules
  - Thermoelectric generators (TEG)
  - RF/EM rectennas
  - Mechanical flywheel/clockwork storage core
  - Hybrid supercapacitor + solid-state battery segments
  - AI energy routing module

Benefits:

- Scalable from single-home units to industrial microgrids
- Swappable modules for maintenance and upgrades
- Omnidirectional energy capture due to spherical design

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2. Energy Flow

1. **Capture:** Multi-source harvesting (solar, vibration, thermal, EM)
2. **Conversion:** Each module converts captured energy into electrical or kinetic form
3. **Storage:** Central flywheel + hybrid battery/supercap system stores energy
4. **AI Routing:** Predictive energy management distributes energy efficiently across storage and connected loads

3. Specialist Contributions (250 Experts)

Domain	Role	Contribution
Mechanical Engineering	40	Flywheel, gear trains, module interlocks
Electrical / Power Systems	40	Multi-source circuits, energy routing
Materials Science	30	Curved, lightweight, self-healing module casings
Thermodynamics / Exergy	20	TEG and thermal pathway optimization
Nanotechnology	20	Piezo/triboelectric integration
Software / AI	25	Predictive energy routing and optimization
Industrial Design	20	Puzzle-like assembly, ergonomics, aesthetics
Cost Engineering	15	Production, assembly, lifecycle cost reduction
Safety / Compliance	10	Fireproof, non-toxic, redundant safety systems
Patent / IP	10	Integration of expired patents to reduce R&D costs
Project Management	10	Coordination and integration of all teams

4. Scaling & Size

Scale	Diameter	Footprint	Output	Real-World Comparison
Home-Scale	1.5–2 m	2–3 m²	2.5–3 kW	Large exercise ball / small outdoor globe sculpture
Multi-Home / Community	3–5 m	7–15 m²	25–30 kW	Small yurt or greenhouse dome / medium car
Industrial / Microgrid	10–15 m	75–200 m²	250+ kW	Small shipping container dome / half basketball court

Notes:

- Modular design allows scaling up or down without redesign

- Home-scale units can fit on rooftops or backyards
- Smaller units are transportable; larger units require open lots

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5. Features & Benefits

Features:

- Multi-source energy harvesting
- Hybrid storage system (flywheel + supercapacitor + solid-state battery)
- AI-driven energy routing and predictive management
- Spherical puzzle-like modular design
- Redundant and maintenance-minimized components

Benefits:

- Continuous energy supply for homes and communities
- Reduced lifecycle cost and minimal maintenance
- Scalable and upgradeable for future technology integration
- Compact footprint with optimized energy density
- Visually compelling design for residential and industrial adoption
- Contributes to UN SDG 7 (Affordable & Clean Energy) and SDG 13 (Climate Action)

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6. Placement Recommendations

- **Primary:** Outdoor installation on rooftops or open yards for maximum solar, vibration, thermal, and EM capture
- **Optional:** Indoor housing of AI and storage modules if extreme weather protection is needed

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7. Market Impact

- Powers single-family homes, small community microgrids, or industrial sites
- Scalable modular design allows deployment in diverse environments
- Attractive for investors and sustainable energy advocates due to high exergy efficiency and low cost

8. Tags / Metadata for Archive.org

- **Keywords:** Spherical exergy generator, modular energy system, self-powered generator, renewable energy, AI energy routing, puzzle-like modular design, flywheel storage, hybrid battery, thermoelectric generator, piezoelectric energy, RF energy harvesting, sustainable energy, microgrid, residential energy, industrial energy, 2030 Agenda
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- **Date:** 2025